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EOSDIS Core System Project

Interface Control Document Between EOSDIS Core System (ECS) and the EOS-AM Project for AM-1 Spacecraft Analysis System for the ECS Project

March 1996

Goddard Space Flight Center
Greenbelt, Md.

Interface Control Document Between EOSDIS Core System (ECS) and the EOS-AM Project for AM-1 Spacecraft Analysis System

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Preface

This document is a formal contract deliverable intended to be a final submittal with an approval code 1. It requires Government review and approval prior to acceptance and use. This document is under ECS contractor configuration control. Once this document is approved, Contractor approved changes are handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan, and changes to this document shall be made by document change notice (DCN) or by complete revision.

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Abstract

This Interface Control Document (ICD) defines the interface between the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) and the EOS-AM Project that supports use of the AM-1 Spacecraft Analysis System (SAS) within the EOS Operations Center (EOC). This document describes the contents, format, and data exchange methods for this interface.

This ICD is consistent with the Functional and Performance Requirements Specification for ECS (Level 3 requirements) and the ECS/AM-1 interface requirements, as described in the ECS Statement of Work (SOW) and the Interface Requirement Document (IRD) Between ECS and the EOS-AM Project for AM-1 Flight Operations.

Keywords: SAS, AM-1, EOS-AM, EOC, ICD, FOT, carry-out

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1. Introduction

1.1 Identification

This Interface Control Document (ICD), Contract Data Requirement List (CDRL) Item 029, whose requirements are specified in Data Item Description (DID) 209/SE1, is a required deliverable under the Earth Observing System (EOS) Data and Information System (EOSDIS) Core System (ECS), Contract NAS5-60000.

1.2 Scope

This ICD provides definition for the system interfaces that exist between ECS and the EOS-AM Project for the AM-1 Spacecraft Analysis System (SAS).

The Earth Science Data and Information System (ESDIS) Project has joint responsibility with the AM Project for the development and maintenance of this ICD**.** Any changes in the interface definition must be agreed to by the relevant participating parties, and then assessed at the ESDIS Project Level. This ICD will be approved under the signature of the ESDIS and AM Project Managers.

ECS Releases are keyed to mission support: Release IR1 provides support to the Tropical Rainfall Measuring Mission (TRMM) Early Interface Testing and Science Algorithm I&T. Release A provides support to TRMM Science Operations and TRMM Ground Systems Certification Testing. Release A also provides the functional capabilities needed to support early ESDIS Ground System Testing for the EOS AM-1 and Landsat 7 missions. Release B provides support to EOS AM-1 Mission Operations and Science Operations, and it provides support to ESDIS Ground System Certification Testing for the EOS AM-1 and Landsat 7 missions. Release B also provides archive and distribution services for the Landsat 7 mission. Releases C & D provide evolutionary enhancements to the ECS services provided in the earlier Releases.

This document reflects the August 23, 1995 Technical Baseline maintained by the contractor configuration control board in accordance with ECS Technical Direction No. 11, dated December 6, 1994.

1.3 Purpose and Objectives

This ICD is written to formalize the interpretation and general understanding of the ECS/AM-1 Spacecraft Analysis System interface. This document provides clarification and elaboration of the SAS interface to the extent necessary to assure hardware, software, and operational service compatibility within the end-to-end system.

This document provides a point of mutual control for these interface definitions for the ESDIS and AM Project Configuration Control Boards (CCBs)**.**

1.4 Status and Schedule

This ICD is delivered two weeks prior to the ECS Flight Operations Segment (FOS) Release A and B Critical Design Review (CDR) for review and approval as a CCB approval Code 1 document. At the Government's option, this document may be designated to be under full Government CCB control. Changes may be submitted at any time for consideration by Contractor and Government CCBs under the normal change process.

1.5 Organization

This document is organized in 5 sections plus appendices. Section 2 contains information about documentation relevant to this ICD, including parent, applicable, and information documents. Section 3 provides an overview of the ECS/AM-1 SAS interface. Section 4 provides an overview of the data exchange framework. Section 5 contains a description of ECS/AM-1 SAS data flows, including data format and content, the data transfer method(s), and error handling. Acronyms and abbreviations are included in Appendix AB.

2. Related Documentation

2.1 Parent Documents

The following documents are the parents from which this document's scope and content are derived.

304-CD-001-003	Flight Operations Segment (FOS) Requirements Specification for the ECS Project, Volume 1: General Requirements
304-CD-004-003	Flight Operations Segment (FOS) Requirements Specification for the ECS Project, Volume 2: AM-1 Mission Specific
423-41-01	Goddard Space Flight Center, EOSDIS Core System Statement of Work
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System
505-41-15	Goddard Space Flight Center, Interface Requirements Document Between ECS and EOS-AM Project for AM-1 Flight Operations
505-41-18	Goddard Space Flight Center, Inter-project Agreement Between AM and ESDIS Projects on Flight Operations for the AM-1 Spacecraft

2.2 Applicable Documents

The following documents are referenced herein and are directly applicable to this document. In the event of conflict between any of these documents and this document, this document shall take precedence.

305-CD-003-002	Communications and Systems Management Segment (CSMS) Design Specification for the ECS Project
305-CD-040-001	Overview of FOS Design Specification for the ECS Project
305-CD-047-001	Flight Operations Segment (FOS) Analysis Design Specification for the ECS Project
510-ICD-EDOS/EGS	Interface Control Document Between the Earth Observing System (EOS) Data and Operations System (EDOS) and the EOS Ground System (EGS)
540-031	Goddard Space Flight Center, Interface Control Document Between the EOSDIS Backbone Network (EBnet) and the EOS Operations Center (EOC)

540-095	Goddard Space Flight Center, Interface Control Document Between the EOSDIS Backbone Network (EBnet) and the AM-1 Spacecraft Analysis System (SAS)
ISO 7498	International Organization for Standardization, Basic Reference Model for Systems Interconnection
RFC768	User Datagram Protocol, J. Postel
RFC791	Internet Protocol, J. Postel
RFC793	Transmission Control Protocol, J. Postel
RFC959	File Transfer Protocol, Internet Standards, J. Postel, J. Reynolds
RFC1510	The Kerberos Network Authentication Service (V5)
209-CD-004-003	Data Format Control Document for the EOS AM-1 Project Database for the ECS Project.
311-CD-001-003	FOS Database Design and Database Scheme for the ECS Project.
none	MIT X Consortium Standard, X Window System Protocol, X version 11, Release 4, Scheifler

2.3 Information Documents

The following documents, although not directly applicable, amplify or clarify the information presented in this document, but are not binding.

194-201-SE1-001	Systems Engineering Plan for the ECS Project
194-202-SE1-001	Standards and Procedures for the ECS Project
193-208-SE1-001	Methodology for Definition of External Interfaces for the ECS Project
none	Martin Marietta Corporation, Spacecraft Analysis System Capabilities Document (Preliminary)
none	Martin Marietta Corporation, (Preliminary) Spacecraft Analysis System Interface Requirements Document
none	Internet Programming, Jamsa Kris, Ph.D., and Cope, Ken; Jamsa Press, Nevada, 1995

3. Interface Overview

The ECS/AM-1 interface for Spacecraft Analysis System (SAS) exists between the EOS Operations Center (EOC), which is an element of the ECS Flight Operations Segment (FOS), and a collocated workstation hosting the SAS. The EOC, located at the Goddard Space Flight Center (GSFC) Building 32, is the focal point for: maintaining EOS spacecraft and instrument health and safety; monitoring spacecraft performance; performing spacecraft engineering analysis; performing high-level monitoring of the mission performance of the instruments; and providing periodic reports to document the operations of the spacecraft and instruments. It is the responsibility of the Flight Operations Team (FOT) at the EOC to implement spacecraft analysis functions in support of these activities using the ECS FOS Analysis Subsystem.

The ECS FOS Analysis Subsystem manipulates spacecraft data for routine EOS spacecraft engineering analysis. The Analysis Subsystem provides the infrastructure for performing routine analysis functions by ingesting spacecraft data, providing tools to manipulate those data, and presenting the data and analysis results in a variety of user-specified standard output formats. Output data from the Analysis Subsystem, in the form of carry-out files, are used by the FOT in combination with the Spacecraft Analysis System to support spacecraft engineering analyses required for the AM-1 mission.

The SAS is a software toolset which provides flight performance and evaluation functions for the AM-1 spacecraft. The SAS is based on the AM-1 Spacecraft Checkout Station. The SAS toolset contains unique AM-1 performance analysis tools, and I&T database tools, including PV-Wave, a commercial off-the-shelf (COTS) analysis package. The SAS toolset may be used by the FOT throughout the mission to support specialized mission analyses at the EOC which are not supported by the FOS Analysis Subsystem. The SAS is developed by the AM-1 spacecraft vendor and is delivered to the EOC integrated into an AM-1 vendor-provided workstation (i.e. the SAS Workstation). The SAS Workstation serves as the sole AM-1 SAS host in the EOC. The SAS Workstation includes both a display and host-attached printer.

Figure 3-1 provides a top-level view of the ECS-AM-1 SAS interface. The SAS Workstation receives, processes, and analyzes carry-out file data provided by the EOC to evaluate spacecraft subsystem performance. In addition, the SAS Workstation receives for analysis AM-1 Solid State Recorder (SSR) trash buffer data from the EOC. FOT operators may work directly on the SAS Workstation or may access the SAS toolset through remote logon from an EOC User Station. SAS analysis results are provided to the AM-1 FOT via display data and reports. Connectivity between the SAS workstation and the EOC for data transfer and remote access to the SAS Workstation is achieved through the EOSDIS Backbone Network (EBnet).

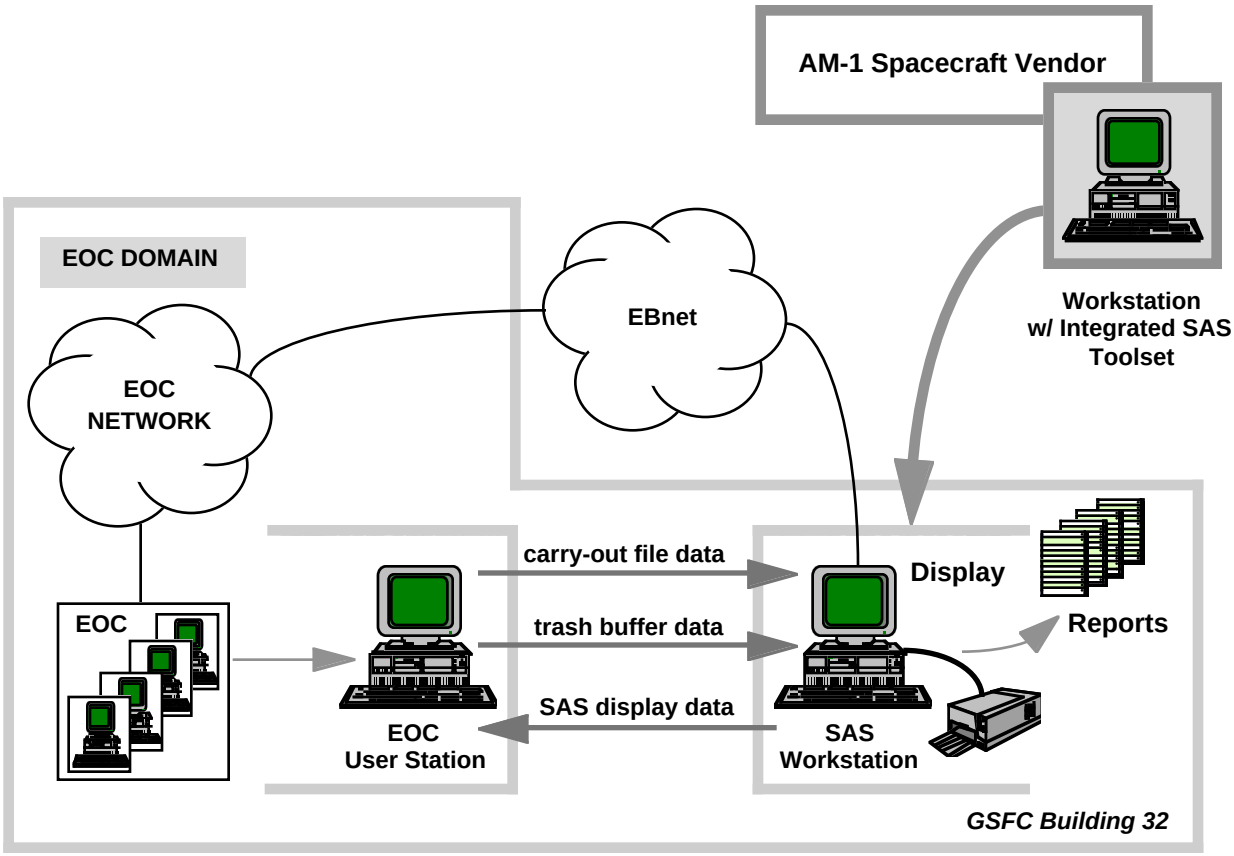

Figure 3-1. ECS/AM-1 SAS Interface Overview

4. Data Exchange Framework

Section 4 describes the data exchange framework supporting the ECS/AM-1 SAS interface. The description includes network interfaces, electronic data exchange protocols, and data exchange security. The data exchange framework is used for ECS/AM-1 SAS data flows which are described in Section 5.

4.1 Physical Network Topology

The EOC User Stations and the SAS Workstation, as shown in Figure 3-1, are collocated within the EOC and may reside in close proximity. The EOC User Stations are connected to the EOC local area network (LAN). The EOC LAN interfaces to the EBnet. The SAS Workstation also connects to the EBnet, thereby providing the physical network link between EOC and the SAS Workstation.

The CSMS Design Specification for the ECS Project describes the topology of ECS local networks (e.g., the EOC LAN), including ECS's connectivity to EBnet. The interface between the EOC and EBnet is controlled through the EBnet-to-EOC Interface Control Document. The interface between the SAS Workstation and EBnet is the joint responsibility of the AM Project, the AM-1 spacecraft vendor, and EBnet. That interface is controlled through the EBnet-to-AM-1 Spacecraft Analysis System (SAS) Interface Control Document.

4.2 Internetworking Protocols

The EOC-SAS Workstation physical communication link is supported by internetworking services that are consistent with the Open Systems Interconnection (OSI) reference model, as defined in the International Organization for Standardization, Basic Reference Model of Systems Interconnection (ISO 7498). These services are also described in "Internet Programming; Jamsa Press, Nevada, 1995". Both connection-oriented services and transaction-oriented services, using the TCP/IP protocol suite [Transmission Control Protocol/Internet Protocol], are provided.

4.2.1 Internet Protocol

The Internet Protocol (IP), specified in RFC791, supports network layer data exchanges between the EOC and the SAS Workstation. The network layer provides the transparent transfer of data between transport entities. The IP addresses for the network nodes and workstations are provided by the EBnet organization and are determined by the time of EOC installation.

4.2.2 Transport Protocol

Connection-oriented transport service is implemented using TCP. TCP, specified in RFC793, is a connection-oriented, end-to-end reliable protocol designed to fit into a layered hierarchy of protocols which support multi-network applications. It provides for guaranteed delivery of data between pairs of processors in host computers attached to networks within and outside ECS.

Transaction-oriented transport service is implemented using UDP. The User Datagram Protocol, specified in RFC768, provides a procedure for application programs to send messages to other programs with minimal overhead. With UDP, delivery of data is not guaranteed, since there is no acknowledgment process or retransmission mechanism. For the EOC-SAS interface, UDP only supports the SAS Workstation remote access using the X-window protocol.

4.2.3 File Transfer Protocol

Data is transferred from the EOC to the SAS Workstation using Kerberized File Transfer Protocol (kftp). File Transfer Protocol (ftp), as described in RFC959, is an internet standard for file transfers that supports retrieval of files from a remote server. Kerberos Version 5 is described in RFC1510 and is a security application that can be applied to any transfer protocol. The kftp provides the same functionality as standard ftp but has an added layer for kerberos authentication. Both ECS and the SAS Workstation must host ftp and Kerberos software. The ECS side of the interface provides the required kerberos key server function.

The kftp is always FOT operator-initiated from an EOC User Station. Data files are transferred from an EOC file server or from an EOC User Station hard drive to the SAS Workstation hard drive. The operator identifies files to be transferred by identifying the files in the UNIX directory of the source system. An ftp “put” command is used to transfer the file(s).

4.2.4 X-Window

The Spacecraft Analysis System toolset on the SAS Workstation can be accessed remotely at each EOC User Station using the X-window protocol. The X-window protocol permits an FOT operator at a local EOC User Station to remotely logon to the SAS Workstation and use available SAS applications. The SAS application runs on the SAS Workstation, while application displays/graphical user interfaces may be interactively accessed at the EOC User Station.

EOC User Stations must host X-window software to access the SAS Workstation through the X-window protocol. The X-window protocol is described in “X Window System Protocol, X version 11, Release 4, Scheifler”.

4.3 Data Exchange Backup Methods

The back-up method for ftp data exchange from the EOC to the SAS Workstation is use of physical media. If electronic data transfer is prevented due to a sustained local or wide area network outage, data files may be copied by an FOT operator onto hard media, carried in person, and loaded to the SAS Workstation. The physical media for backup transfer of carry-out files is 4 millimeter (mm) digital audio tape (DAT). Data files are copied onto DAT using a UNIX “tar” command for creating a “tarfile”, i.e. tape archive file. The same command is used by the SAS Workstation to extract the data files. The DAT media permits an EOC File Server 4mm tape drive to write a 2 Gigabyte (GB) file onto a single DAT volume. Multiple files may be contained on a single tape; individual files are not to be split onto multiple tapes.

Backup method for remotely accessing the SAS display data on an EOC User Station through X-Window is for the FOT operator to move from the EOC User Station to the SAS Workstation and view in person the SAS display data.

4.4 Data Exchange Security

For EOC-to-SAS Workstation data exchange, file transfer security is achieved by use of kerberos ftp (kftp), which involves encrypted passwords and user identifiers. Kerberos provides authentication without passing passwords in clear text.

X-Window usage requires protection of the EOC User Stations actively using the X-window protocol to prevent passage of unauthorized X-Window traffic from non-EOC network locations other than the SAS Workstation. Authentication of FOT operators remotely accessing the SAS Workstation through the X-window protocol is also required in accordance with the SAS Interface Requirements Document. Assignment and control of user IDs and passwords are to be managed by the FOT.

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5. Data Flow Descriptions

Details for the data flows between the EOC and the AM-1 SAS Workstation are described in this section. The EOC FOT provides carry-out files containing FOS Analysis Subsystem output data, SSR trash buffer files and standard analysis products to the SAS Workstation for SAS toolset analyses. The FOT can access the SAS toolset both directly at the SAS Workstation and remotely from the EOC User Stations.

5.1 Carry-Out File Data

The FOS Analysis Subsystem within the EOC generates carry-out files, in accordance with the FOS Analysis Design Specification (305-CD-047-001) to support routine FOT analysis operations. The FOT will use carry-out files as the mechanism to provide AM-1 spacecraft data to the Spacecraft Analysis System for further manipulation. A Carry-Out File is a standard output file created by the FOS Analysis Subsystem generic output file function in response to an FOT request. The standard carry-out file format provides the means to represent different parameter data in a consistent manner. Created carry-out files are protected and available as "read-only". Carry-out files can be generated to contain the following data:

- AM-1 spacecraft housekeeping data
- AM-1 spacecraft health and safety data
- AM-1 diagnostic telemetry data
- Network Control Center (NCC) User Performance Data (UPD) message data [also known as operator data message (ODM) data]
- EDOS Customer Operations and Data Accounting (CODA) message data

Carry-out files are transferred on an as-needed basis. There is no set frequency of delivery. Carry-out file size for electronic data transfer may not exceed the 2 GB UNIX file size limit. Physical media for the backup transfer mode permits a single 2 GB file to be written onto a single media volume.

5.1.1 Carry-Out File Format and Contents

The general format and contents of an EOC carry-out file are shown in Table 5-1. Carry-out file data is provided in the American Standard Code for Information Interchange (ASCII) format to the SAS Workstation. Each record in a carry-out file terminates with an ASCII new-line character. Fields within in a record are separated by the vertical bar "|" delimiter. Fields may vary in length up to the maximum size indicated.

Carry-out file contents vary depending on mission start and stop times and set of parameters specified in each FOT file generation request. Valid Parameter Mnemonics and Parameter IDs are found in the EOC Project Database (PDB), the operational point of control for AM-1 spacecraft definition files, which are provided and validated through the collective effort of the FOT, the AM-1 spacecraft vendor, and other designated sources.

Each carry-out file includes one File Header, at least one Header Record, and one or more Data Records. A single Header Record is included for each spacecraft parameter addressed in a carry-out file. There may be one or more Data Records associated with each Header Record. Data Records map to the corresponding Header Record through the Parameter ID. Data Records include converted data values and may also include raw data and decoded data. Converted data is presented in the form of engineering unit (EU) converted values or discrete state converted values. A sample carry-out file is shown in Figure 5-1. CH01

Table 5-1. Carry-Out File Data Format (1 of 2

Item #	Data Item	Data Type	Format / Maximum Size (in Bytes)	Values	
- -	***File Header***	- -	- -	- -	
H1	Time of First Parameter in string format, YYYY/DDD HH:MM:SS.MMM	String	ASCII 21B	Valid mission times	CH01
H2	Total Number of Header Records	16 Bit Integer	ASCII 5B	0 to 65535	
- -	***Start Header Record***	- -	- -	- -	
H3	Parameter Mnemonic	String	ASCII 20B	Valid Parameter Mnemonic per PDB	
H4	FOS Parameter ID	16 Bit Integer	ASCII 6B	Valid Parameter ID per EOC Data Base	
H5	AM-1 PDB Parameter ID	16 Bit Integer	ASCII 5B	Valid Parameter ID per AM-1 PDB	
H6	Data Type defined by: R = Real I = Integer S = String (e.g. Discrete State String)	Character	ASCII 1B	R, I or S	CH01
H7	Start and Stop Time of Database for which this PID is invalid. String format as in H1 with hyphen separator[1]. This parameter identifies the time period of any data dropouts in the carry out file due to an invalid or nonexistent PID entry in the database. This field is unfilled when a valid database entry exists for this PID for the entire time period covered by the dataset.	String	43B	Valid Mission Times	CH01
- -	***End Header Record*** *[Repeat Header Record for each Parameter]*			- -	
- -	***Start Data Record***	- -	- -	- -	
D1	Time of Parameter, stated as offset time from Item H1 the start time of the first parameter	Real 8 Byte Floating Point Number	ASCII 16B	Offset Time in Seconds	CH01
D2	FOS Parameter ID	16 Bit Integer	ASCII 6B	Valid Parameter ID per EOC Data Base	
D3	AM-1 PDB Parameter ID	16 Bit Integer	ASCII 5B	Valid Parameter ID per AM-1 PDB	
D4	Raw value[1] (Raw values are not reported for ground telemetry.)	Integer	ASCII 10B	All	CH01
D5	Converted value	Variable per Item H6	ASCII 16B	Variable per Data Type	CH01
D6	Decoded value [1]	32 Bit Integer	ASCII 10B	All	

Note 1: Field is unfilled when value does not exist for the parameter identified. See sample record.Table 5-1. Carry-Out File Data Format (2 of 2)

Item #	Data Item	Data Type	Format / Maximum Size (in Bytes)	Values	
D7	Status Word, containing data for status flags arranged as bits in a 32 Bit Integer where Bit 0 is the Least Significant Bit. Bit 0 RedHi Bit 1 RedLow Bit 2 YellowHi Bit 3 YellowLow Bit 4 Delta Limit Bit 5 Rail Limit Bit 6 Quality Bit 7 Conversion Error Bits 8-31 Reserved for Future Use	32 Bit Integer	ASCII 10B	All	CH01 CH01 CH01
- -	***End Data Record (End Line)*** *[Repeat D1 - D7 until End of File]*			- -	CH01

Sample Record ***Sample Record Data Description***

1999/234 19:23:43.024	*; time of first parameter*	CH01
3	*; total number of header records*	
MPSEMISA1|123|23IR||	*; first header record*	CH01
MPSEMISA2|124|24IR||	*; second header record*	CH01
MPSEPMONOUT2|13456I3456|I||	*; last header record. Rest of file is data.*	CH01
0.0|123|23I029|23.5676||0	*; data record for FOS Parameter ID 123, no decoded value*	
0.001|124|24I099|83.5676||4	*; data record for FOS Parameter ID 124, no decoded value*	
0.052|123|23I029|23.5676||0	*; data record for FOS Parameter ID 123, no decoded value*	
0.055|124|24I089|80.5676||4	*; data record for FOS Parameter ID 124, no decoded value*	
1.000|13456|3456I4294967295||-1|0	*; data record for FOS Parameter ID 13456, no converted value*	
.....etc.....		

Figure 5-1. Sample Carry-Out File Record

5.1.2 Carry-Out File Data Transfer Method

The FOS Analysis Subsystem accesses spacecraft data and formats an FOT operator-specified data set into a carry-out file. The carry-out file is delivered to the SAS Workstation using ftp as described in Section 4.2.3. Files are transferred directly to a directory on the SAS Workstation. Identification of this directory location is controlled by the Spacecraft Analysis System Interface Requirements Document. The Spacecraft Analysis System reads the transferred ASCII carry-out files in the directory and ingests the necessary spacecraft data for processing.

5.1.3 Carry-Out File Data Transfer Error Handling

Collocation of the EOC User Stations and the SAS Workstation within the EOC enables quick and easy operator correction of data transfer errors. Carry-out file data errors are operator corrected by regeneration of the carry-out file from the FOS Analysis Subsystem. For loss of communication interface between the EOC and the SAS Workstation, operator intervention permits transfer of data using physical media as described in Section 4.2. Interruption of ftp requires FOT operator intervention to reinitialize ftp transfer from the EOC User Station.

5.2 AM-1 SSR Trash Buffer Data

AM-1 Solid State Recorder (SSR) trash buffer data acquired from EOS Data and Operation System (EDOS) are provided by the EOC to the SAS Workstation for analysis.

5.2.1 AM-1 SSR Trash Buffer Data Format and Contents

The AM-1 SSR trash buffer file format and contents are described in ICD Between the EDOS and the EOS Ground System (EGS), 510-ICD-EDOS/EGS.

5.2.2 AM-1 SSR Trash Buffer Data Transfer Method

The AM-1 SSR trash buffer file is delivered to the SAS Workstation using ftp as described in Section 4.2.3. Files are transferred directly to a directory on the SAS Workstation. Identification of this directory location is controlled by the Spacecraft Analysis System Interface Requirements Document. The Spacecraft Analysis System reads the AM-1 SSR Trash Buffer file in the directory and ingests the necessary data for processing.

5.2.3 AM-1 SSR Trash Buffer Data Transfer Error Handling

Collocation of the EOC User Stations and the SAS Workstation within the EOC enables quick and easy operator correction of data transfer errors. For loss of communication interface between the EOC and the SAS Workstation, operator intervention permits transfer of data using physical media as described in Section 4.2. Interruption of ftp requires FOT operator intervention to reinitialize ftp transfer from the EOC User Station.

5.3 Analysis Products

The FOS Analysis Subsystem within the EOC generates a variety of analysis products, such as statistics reports, to support routine FOT analysis operations. Analysis products needed for SAS processing will be delivered to the SAS Workstation using ftp as described in section 4.2.3. Formats for the various analysis products will be defined in FOS Users' Manuals and not in this ICD.

5.4 SAS Display Data

FOT operators may access the SAS toolset functionality directly at the SAS Workstation or through remote logon to the SAS Workstation. SAS results are provided to the AM-1 FOT operators via either visual display data or printed reports from the SAS Workstation attached printer.

5.4.1 SAS Display Data Format and Contents

The SAS display data is the result of processing performed by one or more of the SAS applications. The content and format of the display data results are contingent on data analyzed and application(s) used by the operator. Display data may be tables, graphs, images and lists. SAS data results are described in the Spacecraft Analysis System Capabilities Document.

5.4.2 SAS Display Data Transfer Method

SAS display data is accessed using X-Windows via EOC User Stations. Remote access to the SAS Workstation is supported by transport services provided through UDP described in Section 4.2.2. The X-window protocol is described in Section 4.2.4. An FOT operator at any one of the local EOC User Stations may use the X-window protocol to access the SAS applications.

Concurrent remote access to the SAS Workstation by up to three EOC User Stations is permitted. The SAS Workstation supports concurrent application usage; however, any individual SAS toolset application is limited to one user at a time.

5.4.3 SAS Display Data Transfer Error Handling

For loss of local and/or wide area networks, direct FOT operator interaction with the SAS Workstation may be used to initiate and complete SAS analysis processes.

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Abbreviations and Acronyms

ASCII	American Standard Code for Information Interchange
CCB	Configuration Control Board
CCR	Configuration Change Request
CDR	Critical Design Review
CDRL	Contract Data Requirement List
CODA	Customer Operations and Data Accounting
CSMS	Communication and Systems Management Segment
DAT	Digital Audio Tape
DCN	Document Change Notice
DID	Data Item Description
EBnet	EOSDIS Backbone Network
ECS	EOSDIS Core System
EOC	EOS Operations Center
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System
EU	engineering unit
FOS	Flight Operations Segment
FOT	Flight Operations Team
FSTB	Flight Software Test Bed
GSFC	Goddard Space Flight Center
I&T	Integration & Test
ICD	Interface Control Document
IP	Internet Protocol
IRD	Interface Requirement Document
LAN	local area network

NASA	National Aeronautics and Space Administration
NCC	Network Control Center
ODM	operator data message
PDB	Project Database
SAS	Spacecraft Analysis System
SOW	Statement of Work
SSR	Solid State Recorder
TBD	To Be Determined
TBR	To Be Resolved
TBS	To Be Supplied
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
UPD	User Performance Data